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Rot in Sheep

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ROT OR FLUKE,

AND

LOUPING-ILL IN SHEEP,

WITH THE

USE OF SALT

AS A PREVENTATIVE.



A Paper Read by

HENRY THOMPSON, M.R.C.V.S.,

AT THE

ASPATRIA MUTUAL AND AGRICULTURAL IMPROVEMENT SOCIETY,

IN CONNECTION WITH THE

ASPATRIA AGRICULTURAL COLLEGE.

THIRD EDITION.

WHITEHAVEN :

PRINTED BY T. BRAKENRIDGE & CO., 18 KING STREET.

1882.



ROT IN SHEEP.

AT a meeting of the Aspatria Mutual and Agricultural Improvement Society, held on the Evening of Friday, the 4th November, 1881, the following paper was read by Mr. H. Thompson, M.R.C.V.S., Aspatria:—

The subject which I have the pleasure of bringing before you this evening is that of Rot in Sheep. There are several kinds of disorders designated Rot, but the subject of my paper is the one caused by the presence of Flukes in the bile-ducts of the Liver.

From the earliest historical records of the diseases of animals, the one in question ranks among the most prominent. Belonging to no particular country, its ravages have been felt on the Continent, in America, and Australia, as well as in the British Isles. And since the sixteenth century a great deal has been written respecting this fearful and destructive malady. Different theories have been promulgated as to its cause, cure and prevention. Scientific men of various grades have given it great thought, and a large amount of research has been gone into both at home and abroad, some giving their sole attention to the investigation of the nature and transformation of the Fluke, both in and out of the body of the sheep; others, having enquired into the peculiarities of the seasons and the class of soils most prone to the disease, so that at the present time, we have arrived at a pretty reasonable position as to what seasons are most liable to

produce the complaint as well as the time of year when the creatures enter into the body of the sheep; the period they remain therein; the ova or eggs they produce; their exit; and the transformations they undergo out of the body from the ova to the larvæ thence to the pupæ; their supposed migration and parasitic condition to molluscs, and their final return to their natural habitat, the biliary ducts of the liver, for mature development and propagation of their species.

It is not my intention to go deeply into what is at present thought to be the natural history of the Fluke, but merely to give an outline—sufficient for the purpose of my paper, nor will I enter into the minute details of the numerous experiments that have been carried on from time to time, such as endeavouring to produce the disease in healthy subjects by giving them the ova or eggs from the bile-ducts of rotted animals. My principal object will be that of prevention, as little can be done in the way of cure when once the animals are stricken, and for the better illustration, I will divide my subject into sections. Any one wishing for further details on the matter will be amply repaid by reading Professor Simonds', M.R.C.V.S., elaborate and exhaustive pamphlet on rot in sheep, which can be had from Mr. John Murray, Albemarle Street, London, for seven penny stamps, and to which pamphlet I am very much indebted for numerous details and valuable information; also in part first of the Journal of the Royal Agricultural Society of England, for the present year will be found the report of interesting experiments now being carried on by Mr. A. P. Thomas, Demonstrator of Anatomy, University Museum, Oxford, on the development of the Liver Fluke, and in the same journal is another article on Rot in Sheep, by Mr. Finlay Dun, showing the alarming extent the disease reached

in 1879 and 1880.—Mr. Dun says that in 1879, “It was estimated that in England and Wales alone, three millions of sheep died or were sacrificed from rot, and the losses in 1880 were equally great.” This, at a rough calculation cannot be called less than £5,000,000 per annum loss to the country! Well may the agricultural world be in a state of depression, what with rents, rates, taxes, artificial manures and feeding stuffs, bad seasons and foreign competition; yet all these difficulties are not, in my opinion, to be compared with the disastrous maladies that infest the fold, and these I think can in a great measure be prevented, and for this object natural commodities are extensively distributed, and only waiting human aid to assist in the balancing effort of the great laws of nature. She is ever bountiful and continually pointing out the right direction by furnishing us with the most essential articles in the greatest abundance! Look at her boundless store-houses in the crust of the earth, as well as the mighty oceans, all rich with agents for our use, benefit and comfort, and from their great supply, man, in his ignorance, over-looks or casts them aside. Deprive us of air, water, salt, wood, coal, stone, lime, &c., and what would be the result? And yet all these are natural commodities!

But to my subject. Professor Simonds in his pamphlet, records periodical outbreaks of this disease in 1735-47-66-92, 1809-16-24-30-53-60-62-79. These visitations were more or less severe according to the amount of rain-fall during the summer months bringing ruin to many a struggling farmer, as well as being a great national loss. The Midland, Southern and Western Counties seem to have been the most affected districts! Well may there be farms to let in these parts! Looking back to the enormous rain-fall we

have had during the summer months for the past three or four years ; witness the Royal Agricultural Society's Show at Kilburn and Carlisle, and although it was favoured with fine weather this year at Derby, the summer of 1881 will long be remembered for its baneful effects on growing crops ; but, I am afraid the worst is still to follow, viz., Rot in Sheep, which generally begins to show itself at the commencement of the winter months, and all periodical outbreaks have been pretty conclusively and satisfactorily traced to excessive summer and autumn rains. During summer, a large amount of heat is absorbed from the rays of the sun, and retained in the soil and with a plentiful rainfall the temperature of the ground is kept in that condition best adapted for the development of insect and parasitic life of almost every class, more especially those creatures that go through certain transmutations previous to their entering into the bodies of the larger animals they inhabit during the cold winter months. The lands most suitable for this purpose are low-lying, marshy pastures, retentive clays, undrained meadows, and lands flooded with fresh water, which from practical observation have been found to be the nursery beds of the embryos and larvæ of the liver fluke. These lands are generally termed unsound, but in very wet seasons, well-drained sound soils are occasionally made infected areas by the ova or larvæ being carried and deposited by floods, that may have submerged them, as well as by hares, rabbits, &c. Since 1587 it has been noted by our earliest authors that if sheep were pastured on wet moist lands in the autumn, rot was certain to follow, while on salt marshes where rain fell in equal abundance as well as being occasionally covered by the rising of the sea, rot has never been known to occur—nay, the contrary effect has been noticed ; viz., that sheep slightly tainted when folded on these lands have so far recovered as

to be made fit for the market. Again, Iceland is said to be quite free from the disease, which is due to the sheep feeding on the sea weeds growing between high and low water marks, while on the banks adjoining the sea in our own country with the *shortest and scantiest* of herbage, we never see or hear of either parasitic or blood diseases, which are so rife in the hilly and Midland Counties—*nature here* showing most distinctly that salt is absolutely necessary for the maintenance of health, as well as proving that the larvæ of the fluke require *fresh water* for their transformation and development; moreover it is acknowledged by naturalists that the fluke is a *fresh water creature*. Further, by the overflowings of the Nile, it is said the disease appears in the upper parts of Egypt in July and continues following the abating of the waters till January. The natives say that thousands of sheep are annually lost by this pest, showing that the larvæ are brought down from the upper and inland parts of the country and deposited on the banks as the waters subside, but we never hear or read of the disease following the over-flowing of lands by sea water. Having thus so far endeavoured to prove what peculiar seasons and localities favour the development of a disease that produces such great destruction amongst our flocks, I must now try to show the effects on the animals and the immediate cause of death, and for this purpose the Veterinary Surgeon, I am sorry to say, has too many facilities offered for post-mortem examinations and the tracing of the

PATHOLOGY OR NATURE OF THE MALADY,

which, without hesitation, may be said, to be a parasitic disease, common to certain localities, following more particularly wet summer months, being due to the presence of small

living foreign bodies termed flukes—in the biliary ducts of the liver; increasing the flow of bile; producing diarrhœa; draining the system of its most essential matters with structural derangement, general and exhaustive debility dropsy and death. At the early period of contamination when the flukes are in the infinitesimal stage no bad effects are observed but rather the contrary which are due to the small creatures stimulating the action of the liver, inducing rapid assimilation and the accumulation of flesh. This period has received marked attention from some breeders who actually put their cast-off breeding ewes on rot-producing pastures even occasionally flooding the land for this purpose, when the ewes flush up into condition and are soon ready for the butcher. But this collection of flesh has short duration; the flukes grow in size and the slight stimulating action reaches an irritative form, when the animals begin to show unmistakable signs of the affection, the continued increased secretion of bile—nature's effort to wash the foreign bodies away makes a heavy call upon the system—diarrhœa supervenes, great emaciation, change of structure, dropsy and death. Seeing that the complaint can be produced when required by flock-masters, there can be little doubt about the nature of the disease being parasitic, and due to the bile-ducts of the liver being infested with

LIVER FLUKES,

of which there are two kinds; the *distoma hepaticum* and *distomalanceolatum*, the latter being the smaller of the two, but of the same family. The *trematoda*, or flat suckorial worms, the history of which is most interesting, and since the introduction of that powerful instrument the microscope, naturalists

have made rapid strides in their research, and the seemingly hidden mysteries of nature have been brought to light with wonder and admiration. Witness the sickly-looking maggot of to-day, which may be the active little fly of to-morrow, sporting in the sunshine as it flies from leaf to leaf ; or, the caterpillar of yesterday, the chrysalis of to-day, awaiting its transformation into the beautiful butterfly ? These objects are seen with the naked eye as we pass along the green lanes. Then what must be the amazement and wonder when the aid of the microscope is required to trace out similar transformations in the smallest living organisms and the metamorphoses of the liver fluke cannot be viewed without interest, passing as it does such a large portion of time out of the body of the animal it finally inhabits ?

The *distoma hepaticum* and *distoma lanceolatum* or liver flukes, are of a dark greenish, yellow-brown colour ; flat, oblong, oval parasites averaging about one inch in length and half-an-inch in breadth at their widest part, anteriorly tapering towards the posterior extremity, and being covered by a fine, thin transparent skin, which on the *hepaticum* is raised into small sharp elevations pointing backwards, having two sucking orifices—hence their name *distoma*—one situated at the extreme end of the creature, and called the oriel sucker, which answers the double purpose of the inlet and outlet of the bile on which it lives ; the other is situated on the under surface, a little behind the former, and is called the ventral sucker, and from its arrangement is supposed to be used for attachment to the mucous membrane of the bile-ducts, as well as being a medium of progression, and found infesting the livers of most of our domestic animals, likewise hares and rabbits, and even man himself, but most commonly in

ruminants, more particularly sheep, and are said to be bisexual, having both male and female organs of generation in one creature, and being able to propagate their species by the deposition of

OVA OR EGGS,

which, on examination by the aid of the microscope, are found to be small oval shaped bodies, averaging about 1-180th part of an inch in length and 1-300th part of an inch in breadth, covered by a hard shell of a yellowish, brown colour, and furnished at one end with a small cap or lid, and containing internally masses of granular matter, from which the embryo of the future fluke is developed. The breeding propensities of the liver fluke are almost beyond all comprehension, and the number of eggs produced by one single fluke is perfectly astounding, being computed by some to reach hundreds of thousands. Mr. Thomas, of the Oxford University Museum, in his report in the Royal Society's Journal, already referred to, says that "in one case he obtained 7,400,000 eggs from the gallbladder of a well rotted sheep; the liver contained 200 flukes, which gave an average of 37,000 eggs to each fluke." Well may our grazing lands be tainted and flocks decimated. The eggs are deposited by the flukes in the bile, and carried by that fluid into the intestinal canal, and dropped with the excrement on to the ground to undergo various transmutations out of the body. Professor Simonds and others have conducted experiments with the view of testing the vitality of the ova, and what length of time the internal granular matter would lie latent before showing signs of gestation; when it was observed that in some the process commenced very early, while in others no change was noticed for a considerable period, thus showing that these small

organisms require certain natural situations and conditions such as heat and moisture, and if too hot or too cold, the germination is suspended or destroyed. But when in a favourable position and suitable temperature—like the yeast plant—development goes on readily. Professor Simonds has also tried to produce the disease in sound animals by giving them large quantities of the ova collected from rotted sheep, but failed to bring on the malady, proving that the flukes were not developed directly from the ova within the sheep in which they were deposited, but that the ova were required to pass through certain forms out of the animal before they could be again generated into ultimate flukes. When the eggs left on the ground find the necessary surroundings for their incubation, the internal granular matter assumes a cellular form and in time small embryos of a ciliated character are developed which when fully matured make their escape from the shells by pressing open the lids or caps, and if immersed in water commence to move about in a jerking fashion, the small cilliæ around their bodies aiding in this motion, seeking for objects for attachment to undergo further change, when, it is presumed, they gain access to molluscs as nurses, and are further transformed into sacs or bags, called by naturalists *cercariæ sacs* or *sporocysts*, when the internal parts undergo division and small *sporules* or larvæ are formed. These, when fully developed, it is thought, again make their escape out of the sacs and look for other foster-parents for further transformation which by boring their way into small water snails or slugs wherein they roll themselves up and pass into the pupal form, throwing off from the body a secretion which hardens and encysts them, and in this form are supposed to be taken up with the food into the stomachs of the animals, when the hardened secretion becomes dissolved by the fluids of the first, second and

third stomachs and the pupæ set at liberty to find their way to the natural habitat—the bile-ducts of the liver—for mature development. Such, then, is about the extent of what is at present known of the transformation of the liver fluke, but as already mentioned, Professor Thomas, of the Oxford Museum, has the matter in hand and is in a fair way of confirming what is already known, or discovering the real natural history, and I say, “God speed him in this great work.” When we take into account the enormous quantity of eggs produced by one single fluke, the migration and distribution of sheep and other animals, our heavy rainfalls and frequent floods in this our changeable climate, there is little wonder that our lands are more or less swarming with myriads of larvæ of these small creatures, so that at certain times of the year one short hour, or even less, is quite sufficient to rot a whole flock of sheep that may be left or get accidentally on to lands of a soft, moist swampy character. The contamination is at times so quick that a large amount of ill-feeling has been caused between seller and buyer, sufficient to lead to unpleasant litigation, of which Professor Simonds gives several illustrations, and this brings us to enquire what is supposed to be the

MOST LIKELY TIME OF DANGER.

From practical observations, *August, September and October* are the months when the largest amount of danger is to be dreaded. *At this time of year* the larvæ have reached that natural condition outside of the body which best fits them for again re-entering the bodies of warm blooded animals wherein they are matured into ultimate flukes during the cold winter months preparatory to the deposit of their eggs on the arrival of spring. But this again depends a great deal on the peculiarity

of the season. If the rain-fall has been plentiful during summer, with a close humid atmosphere, the sheep can be, and are, infected soon after midsummer, or if the autumn and early winter months are open and free from frost, the contamination may take place even in November. This latter period is most observed in Fell sheep when brought down from high-land pastures to the low lying grounds, but once *frost* sets in, all danger of infection is past, but those animals which have had the misfortune to be placed on unsound pastures must sooner or later show

SYMPTOMS

of the contamination, though like all other parasitic diseases little or nothing is observed during the earlier period, when the creatures are small and undergoing preparatory change as they pass through the stomachs on their way to be located in the bile-ducts of the liver, which occupies from six to ten weeks or even more in the latter part of the summer and autumn months. On reaching their destination, they grow in size and stimulate the liver into increased action, which ultimately impairs its functions, and implicates all the other organs of the body, when the animals begin to show signs of prostration. The face has a sharp, cold, pinched, dull appearance. The eye loses its brightness and on turning up the lid instead of the fine healthy red streaks, we find pale yellow strings. The wool is of a dry, harsh, dirty, cold, blue colour. It is also clapped close to the body and comes out almost on the slightest touch, the belly is tucked up and the animal has lost that bulky buoyant appearance, seems unhealthy, and altogether languid and dejected. The skin is dry and scaly, the mucous membrane is of an unnatural paleness, the flesh

wastes away from the body, the back drops down, the spine is sharp and prominent—termed razor backed. These symptoms become more aggravated as the disease advances, dropsical swellings are noticed on various parts of the body, more particularly under the lower jaw, when the animals are said to be poked; the belly now becomes pendulous; diarrhœa sets in, and the animal finally sinks down from extreme exhaustion, and death closes the scene. But it is only after post-mortem examination that the true nature of the complaint is revealed; therefore in order to prevent the serious losses arising from the frequent visitation of this malady, as soon as stock owners are at all suspicious of their flocks being infected, more especially after being on doubtful pastures, it would be advisable to have an animal occasionally slaughtered, and if on examination the liver is found to contain flukes, more particularly in *October, November or December*, the herds that have been similarly placed should at once be sent for slaughter. Once the creatures gain the natural habitat there they will remain to complete the last stage of development and to propagate for future generations. From the description of the morbid aspect of the living animal and our knowledge of anatomy and physiology it would almost lead us to anticipate the

POST-MORTEM APPEARANCE

of the body. This in a great measure depends upon the period the animals have been afflicted, which is more or less modified by the long or short duration of the disease as well as the condition under which the animals have been placed and cared for. Examinations made early on may reveal nothing but a dark congested state of the liver, which is very

irregular in outline, with hard mottled patches here and there, as well as small bluish white streaks, and the presence of flukes, which at this period are of a pale, dirty, green colour. Subsequent post-mortem shows great and general emaciation of the whole body—the animal being nothing but skin and bone. On removing the skin, the muscles or flesh are found to be soft and flabby, and an unnatural paleness is observed throughout the body, as if the animals were entirely bloodless. Little or no fat is to be seen, here and there are accumulations of water, more particularly under the lower jaws, neck and thighs. *One remarkable fact is that the flesh never stiffens after being slaughtered and dressed.* On opening the body, the abdomen is found to contain a large quantity of water varying in colour and density according to the extent of the complaint. All the internal organs, like the flesh, have a soft bleached appearance, the net or mesentery is like a lot of yellow matted cords. The liver, the principal organ affected with structural derangement, varies in different subjects, but generally speaking it is of a peculiar yellow clay colour and at times is so hard that it is easily broken. The bile passages are enlarged and thickened; the large canals are much dilated and stand out above the surface of the liver, which, on being cut into, are generally found to contain large quantities of flukes. It is an old saying that a well rotted sheep rarely hears the cuckoo, yet I have seen sheep that have been well cared for, outlive the period required by the fluke for location in the liver, but the lesions caused by the presence of the parasites are so extensive that the animals are seldom, if ever, made payable, and on making post-mortem examinations of such cases we find that the flukes have left their habitation and are found in the gall bladder and all along the intestinal canal, either having robbed the constitution of the animal they infected to such an extent that they

cannot get sufficient food to support them any longer, or *they have reached the natural limit of their existence*. Thus, then, the natural history of the liver fluke, the symptoms, and post-mortem appearance presented by the animals infested lead us to enquire if anything can be done in the way of

TREATMENT.

This I am sorry to say is not at all satisfactory. Looking at the anatomy of the liver and the arrangement of the bile ducts, we are led to ask "In what manner are we to reach the creatures located therein?" Certainly there is one great advantage, we have in gaining almost direct access to the liver with medicinal agents, and that is through the special circulation of the portal system, communicating almost directly between the stomach, small intestines and the liver, and carrying the new materials absorbed from the food which passes through the liver before gaining the regular circulation.

When we take into account the peculiar arrangement of the digestive organs of the liver fluke and note how it imbibes its food through the oriel sucker, which is firmly closed after it has had its fill, and retained for a certain period and ejected by the same opening; we arrive at the conclusion that the only way we can reach the creatures with medicinal agents is by loading the system of the affected animals with materials that will not prove injurious to their health; yet at the same time will so saturate the bile on which the fluke lives that it will cause its utter annihilation.

But owing to the important fact that medical substances are liable to undergo chemical change on their way through

the stomachs to the liver, the desired effects are to a certain extent counteracted; so that all the boasted cures that have from time to time been preached to the public, when fairly tested have, as yet, proved fruitless. However, a great deal may be done to relieve the affected animals by giving good, wholesome, dry, nutritious food and warm shelter, combined with suitable matters that will assist to fortify the system against the inroads of the disease, and tide them over the period that the fluke naturally infests them. But this we would only recommend in the case of breeding ewes, which are on many occasions only observed to be affected with the malady when they commence to lamb, by the fœtus and its membranes being in a soft, watery, bleached condition. In other classes of sheep, immediately the complaint is noticed we would suggest sending to the butcher, for all cases that have passed through the courses of the malady make little or no progress during the summer, and it is a well-known fact among flock masters that two or three frosty nights prove fatal to such animals.

The following is the treatment I recommended to Mr. John Twentyman, of Blennerhasset Farm, who about the first week in August last year sent 65 sheep to graze on an outlying pasture he had taken for the season, and where they remained till the middle of September, when he brought them to the home farm at Blennerhasset. Shortly before Christmas they were observed to be doing badly; wool clapped down to the body and anything but healthy. On the 6th January one was killed when flukes were found in the liver. Mr. Twentyman was very much surprised at this, as he had no rot-producing land on his farm, he consulted me upon the matter, and the 65 sheep were put under treatment when sulphur, tar, turpentine, assafœtida, camphor, phenyle,

and other remedies were tried, but without any good effect, although the animals were housed at nights, and had a liberal supply of cake, corn, bran, and hay. I then recommended one teaspoonful of common salt to each sheep every morning in crushed oats, bran, and cake, with one gill of lime water every night. This plan proved successful, as only 15 of the animals died and 50 recovered. The last death was in May and on post-mortem examination the gall bladder and intestines contained large quantities of flukes, but very few in the liver. And although the sheep were cured so far as affection went, yet they failed to show any profitable improvement during the summer grazing. From these important data I draw the reasonable deduction that it is always best, when practicable, to hasten maturity, and consign at once to the shambles. But I may here notice another important matter in connection with this case.

During the time the sheep were affected, Mr. Twentyman had a quantity of crushed rock salt in the cart shed, which he intended for application to the land, and every morning when the sheep were let out to the pastures they rushed eagerly to the salt heap and commenced to eat of it greedily. He also had several lumps of the same material in the fields, which the poor animals licked in turn, as if nature were crying out on the top of the question--"*Heal yourselves.*" Now it will be readily understood by every one in any way acquainted with flukes that the land once depastured by affected animals is difficult to get clear again, but in this case, *the pastures were top dressed with salt in the spring* and up to the present date no further traces have been found. On the contrary, since midsummer four rams and two lambs having injured themselves by fighting had to be killed, and their "plucks" were found by the butcher to be the soundest he

had seen this season ; not a single fluke was observed. From what I have adduced, we may infer that salt acts as a preventive, both internally as a medicine and externally as a land dresser and purifier. *Thus it may be that the inward doses had to a certain extent injured propagation, and that any vitality which might have remained in the deposited ova had been destroyed by the salt dressed pasture on which they fell.*

Professor Simonds recommends the following preparation : Ground oilcake, peameal, one Winchester bushel each ; salt and powdered aniseed, 4lbs. each ; and sulphate of iron, 1lb. well mixed, and half-a-pint to be given daily. This compound is said to be highly beneficial in maintaining the strength of the animals as well as having a tendency to destroy the parasites. The Arabs, when they discover the malady, drive their flocks to the salt bush, which they have, from long practical experience, found to answer best. For my own part I like the salt and lime, with good food and shelter as recommended to Mr. Twentyman. This treatment can be continued for any length of time without any bad effects on the constitution of the sheep, one agent balancing the other ; and my idea is, that when their elements come together in the chemical laboratory of the body a decomposition takes place, and chlorine is liberated from the salt, which so impregnates the bile that the parasites are destroyed.

I may here note that I have found the salt and lime treatment equally as efficacious in hoose in calves and stirks, caused by the small thread worms in the bronchial tubes. It is an old remedy, and was a great favourite with the late Thomas Mann, of Aigle Gill—a man well known to most of you, and whose common-sense views of the treatment of horses and cattle, stamped him as one of the first practitioners

of the day. And although we may now and again effect a cure in rot, I ask what real practical or profitable value is it to the farmer or community at large? Had we not better turn our attention to the measure which the old axiom tell us is far better than cure, viz.:—

PREVENTION.

Before attempting to suggest any preventive measures, it will first be necessary to offer a little explanation as to when they can be best effected.

The first period—This may be set down from July to November, according to the state of the weather as already mentioned, when the *pupæ* are taken into the stomach with the food, to find their way to the bile ducts of the liver for location and development.

The second stage may be reckoned as occurring from September to January. This is the time when the sheep begin to show signs of the infection.

The third period may be stated to be from January to May or even into June; the fluke, as already stated, being bisexual, during this latter stage commences to breed, and deposits the ova or eggs into the bile which are carried with that fluid into the intestines, and finally dropped upon the ground, to undergo the transformations out of the body—always bearing in mind that this occurs in the *spring months only*, as previously named.

It will be remembered that, on the deposition of the ova, it is essential, in order to continue the transformations, that the eggs be deposited on a moist *fresh water* surface, thus proving

that undrained land, or a wet season, is favourable to their development, as well as wet patches, which are the nurseries or hot-beds of the parasite. This being so, it follows that the best way to try preventive measures is at this particular juncture, when the parasite is in what may be termed the lowest form of organisation, and is therefore the most easily coped with. *Now salt marshes are self-acting, self-curative*, as has been pointed out by the laws of nature, and therefore the closer we follow the dictates of the Great Teacher the better. In order to imitate this, if rough, crushed rock-salt be put upon the land previously, say in March or April, it is gradually dissolved and becomes in a state calculated to destroy the small embryo-flukes, immediately they burst open the lid of the shell, and, as previously stated, being a fresh-water creature the young embryo is annihilated by the action of the salt the moment it springs into life on its own account, but once it attaches itself to other parasites the chances of its destruction are doubled. Therefore I say, "*Take time by the forelock and have all the suspicious pastures well dressed with 5 to 8 cwt. per acre of rough ground rock-salt in March, April, or May* ; by these measures you can gain a treble advantage, for not only will you destroy the parasites and germs which lie lurking in the soil, but you also increase the nutritive properties of the herbage, which in turn benefits the animals feeding thereon by supplying one of the most essential elements necessary to the true formation of blood, the ashes of the clot of which are found upon analysis to contain about 54 per cent. common salt. Professor Simonds, in his pamphlet (page 99), objects to the sowing of salt on the land with the view of destroying the cercariæ, as it would in his opinion necessitate frequent repetitions of the salt in one year which he considers would be injurious to the pasturage. I differ *in toto* from the learned professor on this point, who apparently forgets at

the last moment that it is only in the spring of the year that ova are dropped on the land to pass their prescribed time out of the body when the weather and soil are warm and genial, which occupies from four to five months, preparatory to re-entering warm-blooded animals during the winter. Professor Williams in his work says, "All writers are agreed that common salt prevents the development of the parasites, and its application to land would be worthy of a trial."

In conclusion—how is it our lands require salt? Immediately we have a scarcity of rain we all cry out, but how few of us think where it comes from, evaporated as it is from our mighty waters—it is said the Mediterranean Sea alone contributes 52,800,000 tons per minute—and wafted by the winds in every direction over the lands to supply their demand moisten the atmosphere, and find its way back again by rivers to the oceans from whence it came! This has been going on for countless thousands of years, and it stands to reason that a large amount of the soluble material will have found its way from our mountain sides and lands to the river beds and bottoms of the oceans; nature in her bountiful way returning the fluids, as already described, but leaving to human agency the replacement of the solids, and for a long period nature has been pointing out to us the necessity of returning these matters, by afflicting our flocks and herds with certain ailments, more particularly those animals pasturing on lands that are not under immediate cultivation.

Salt is everywhere plentiful; it is readily procured by the evaporation of sea water as well as quarried in a solid state from the earth, and by our united efforts how soon could our lands be well supplied; 20,000 acres could be amply dressed

with salt for the amount of money that has been spent *this year* in our own *county alone* in petty agricultural shows, and I ask what practical value are they to the public?

Having been closely associated with the working of the Aspatria Agricultural Co-operative Society since its foundation in 1870, I have paid great attention to the various natural and chemical manures, their application and effects on animals in health and disease, and during the past ten years I have noted the great diminution of blood and parasitic diseases on soils which have been dressed with salines—viz., common salt and kainit, and it may be interesting to know that during this time nearly 5,000 tons of these materials have been applied to the lands in our immediate district.

Hoose in young calves and stirks has almost disappeared, and should a case be met with you find upon inquiry that these salines have not been applied to the pastures upon which the animals have been located. Blood affections, as redwater, rheumatism, and blackquarter are also fast vanishing from the district, *while on lands that have been well dressed with salt, rot in sheep is not known*, and from close observation I have found the use of salt as beneficial to the maintenance of health, tone, and vigour in the highest forms of vegetable and animal life as it is destructive to the lowest forms of organisation.

The following are instances of some of the beneficial results of its application. A farm at Edderside, when occupied by Mr. Twentyman, now of Blennerhasset Farm, had been noted for generations for redwater, was entirely freed during his tenancy by *salt dressings*. On Gillgooden, a grazing pasture, occupied by Mr. Holliday, Plumbland Mill, redwater was also common, and since salt has been applied the disease is un-

known. Mr. Norman, of Hall Bank, on his farm in Surrey, had numerous fatal cases amongst his sheep from a malady allied to *loup-ill*, *stomach staggers* or *ergot*; by dressing the land with salt the disease has disappeared.

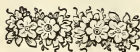
Millom Parks have for a long period been known for red-water and dysentery in cattle and stomach staggers in sheep. The new tenant, Mr. Harker, of Salt House, Millom, in 1880 had 20 cows in redwater and lost 9—and also had nearly 100 fatal cases of stomach staggers, as he names it, in sheep—at the back-end of the year he came over and consulted me as to the advisability of applying salt, and on my recommendation he bought 120 tons of rough crushed rock-salt and dressed the parks at the rate of 8 cwt. per acre. He now writes to me saying, that he has only lost 2 cows in redwater in the month of May and 2 sheep, and is thoroughly convinced that the salt has done an enormous amount of good—the fatal cases being attributed to the old rough grass upon which the salt had not had time to act, as it was into March before they finished dressing the land.

LOUPING-ILL.

The malady from which Mr. Norman's and Mr. Harker's sheep suffered, although named *stomach staggers* and *ergot*, was nothing more or less than the disease called *loup-ill*, which is so very destructive in Scotland, and has received almost as much attention as *rot*. It generally commences with a trembling staggering gait, falling down in convulsions, followed by paralysis and death; and, in my opinion, is due to the want of certain essential matters in the blood. In order to have healthy functions of the body the blood must be properly supplied with elements necessary to act upon the *nerve centres*, so that the nerve fibres may keep the organs of the system

under control. A deficiency of any one particular element will cause derangement, like an electric machine the battery must be properly supplied or we have no electric current, so with the nervous system, and, having already said that the ash of blood contains 54 per cent. common salt, it is reasonable to think that if blood requires so large amount of this valuable article for the establishment of healthy actions, that a want of it must cause disorder. The lands on which the complaint is mostly found having been robbed of the natural alkalies, the herbage in turn is deficient and does not reach mature development, aborting or seeding imperfectly before its time, consequently the animals grazing thereon suffer. And from the practical fact that Mr. Norman and Mr. Harker's lands have been benefited by the application of salt, as well as from close observation I say fearlessly, that if these classes of lands, as well as wet, swampy pastures, were well dressed with this great natural and extensive agent, that LOUPING-ILL and ROT IN SHEEP would soon be as things of the past. Therefore I say, let us follow the dictates of Nature, whose book is ever open, teaching us the right direction. "We are the apprentices, she the mistress."

Let us then be up and doing,
 With a heart for any fate,
 Still achieving, still pursuing,
 Learn to labour and to wait.



DISCUSSION ON MR. THOMPSON'S PAPER.

At the conclusion of the reading of the paper, Mr. Thompson described the production and development of the liver-fluke, which is the cause of sheep rot, by means of a series of drawings, prepared by Mr. W. C. Taylor, illustrating the insidious little animal in all its various stages of existence, after which the Chairman (Mr. Wm. Norman, Hall Bank) said they must all feel indebted to Mr. Thompson for the very lucid manner in which he had brought before them the causes, results, and probable means of eradicating these pests from among their flocks. Mr. Thompson had alluded to his (the Chairman's) experience of using salt. He might say that before he went to High Close Farm THEY COULD NOT GET SHEEP TO LIVE UPON IT, ALTHOUGH IT HAD BEEN FREQUENTLY DRESSED WITH LIME, BUT BY THE USE OF SALT HE COULD NOW KEEP SHEEP UPON IT TILL THEY WERE SO OLD THAT THEY HAD NOT A TOOTH IN THEIR HEADS. On his farm in Surrey he had lost a quantity of sheep from louping-ill, and by dressing the land with salt the disease had disappeared. Since he began he had been using about 20 tons of salt annually on that farm. He also believed it had been the means of removing rot in sheep at High Close, and redwater in cattle at Gillgooden. There was between £3,000 and £4,000 spent annually in small agricultural shows in Cumberland, and he would like to know what good they did? (Hear, hear.) The Aspatria Show would not have been carried on as long as it had been if it had not been for the exertions of Mr. Thompson, and he (the Chairman) was very glad that Mr. Thompson had come round to his way of thinking. (Laughter.) Twenty thousand acres

of land could be dressed with a proper quantity of salt with what these shows cost, or they could bear the expenses of a tenant farmer's candidate for a county constituency with the amount. (Cheers.)

Mr. TWENTYMAN (Blennerhasset) said there was no doubt disease in sheep was a very serious matter. During the past summer he made a visit to the South of England, and while there met with a farmer who had lost nearly the whole of his flock for three years in succession from this disease. From what he had seen he was very much in favour of salt as a remedy, as advocated in Mr. Thompson's paper. On the High Close Farm, already referred to, which had been thoroughly limed, he had seen the sheep in a very bad state indeed; and on the farms he had occupied, when salt was laid down, he had seen the sheep go to it, and lick it on their own account, as if instinct had led them to know what would be beneficial to them in their affected condition.

Mr. G. T. CARR (Silloth) thought there was a good deal in what Mr. Thompson had been saying, and no doubt he had indicated the cause of the disease in a great measure, but he (Mr. Carr) could not think that the want of salt was altogether the cause of rot. He had often seen sheep that were put on the marshes—which were frequently submerged in salt water—suffer severely from rot. With reference to the salt remedy, he thought the “little enemy” in its first stages might be tried in salt and water, to see if that would terminate its existence. He believed hunger had much to do with causing it. With reference to the gathering of the supposed intermediate agents from the grass—which Mr. Thompson had alluded to, as recommended by some authorities, in describing the diagrams—when it was in its mature outward state, he thought that

was quite impracticable ; and the School Boards would also interfere with the employment of children.

The CHAIRMAN : Do you not think the sheep have been rotten before they were put on the marsh ? I don't think good sound sheep sent on to salt marshes would rot.

Mr. W. PATTINSON (Aspatria) : There may also be more kinds of rot than one ; and that which the sheep take on the marshes may not be the one referred to in Mr. Thompson's paper.

Mr. BROCKBANK (Heathfield) : The paper stated that it was chiefly in swampy places, where the grass was long, that the fluke was produced. I have often observed on land where the grass is very short, that rot has been produced.

Mr. THOMPSON : Is there any portion of the marsh ever covered with fresh water ?

Mr. CARR : Fresh water comes down sometimes from the upper lands, and overflows portions of the marshes.

Mr. THOMPSON : Then, that will at once account for the production of fluke on the marshes.

The CHAIRMAN : I do not think rot has been found to attack sheep on Burgh Marsh.

Mr. CARR : No ; I allude to Skinburness Marsh. I am still of opinion that hunger has much to do with causing the disease.

Mr. THOMPSON : Hunger may produce rot of some kinds, but not the fluke rot.

Mr. CARR said he was not prepared to go into the whole facts of the matter, but he believed he was correctly informed that sheep had died from rot on the marshes.

Mr. THOMPSON: What kind of rot? and what kind of marshes? Not salt marshes, I'm sure.

Mr. CARR: The kind of rot described with flukes on the liver.

Mr. THOMPSON said it had been proved that they were fresh water creatures, as they would not live where salt was. With reference to short grass producing the disease, as stated by Mr. Brockbank and other authorities as well, he begged to differ, as we invariably find small damp swampy places on all kinds of grazing lands, with lank vegetable and fungoid growths, which are the nursery beds of insect life; and the sheep, as if by instinct, avoid these places as much as possible, and crop the other portions of the pastures quite bare, but from short allowance were occasionally driven to eat the rough, coarse grass, and thus contracted the disease. This view was further supported by the fact, that sheep live and do well on the short herbage on the banks adjoining the sea.

Mr. BROCKBANK said that on Salkeld Close he had 200 rotted lambs, but the old sheep did not take the infection. That was a very dry place, and in a measure confuted the opinion that if the land was dry the flukes could not live.

The CHAIRMAN: There are several wet places on Salkeld Close, but the lambs might have contracted the disease before going there.

Mr. TWENTYMAN, in reference to what Mr. Carr had said about the marshes, stated that when he went to live at Edder-

side, he was always told to take his sheep on to the salt marsh to save them from rot.

Mr. CARR : It was sheep that had been put on to the marsh to winter that I allude to.

Mr. THOMPSON : Then the disease must have been contracted before the sheep were put on the marsh, because, in fluke, it is seldom contracted after October, and never after frost.

Mr. FARRALL said he had listened with much pleasure to the paper, and also to the remarks which had followed. It was quite clear that Mr. Thompson was able to answer by facts any question that cropped up. In reference to the salt marshes it was evident that fresh water often stands, and may foster the production of the disease ; although it was most likely to have been contracted before the flocks were put on the marshes. In differing from other authorities, Mr. Thompson had also shown why he differed from them, which he thought was a very important feature in the paper. In support of his theory of salt as an exterminator of the disease, he had also given instances of proof where salt had been successful in clearing the land from the disease, He (Mr. Farrall) thought peameal, as recommended by Professor Simonds, could not be good treatment, either for a sickly man or beast. He would like to hear Mr. Thompson's opinion on that, after which he had a few more questions to ask.

Mr. THOMPSON : I do not agree with Professor Simonds in the recommendation of pea-meal. It is far too heating ; and the liver being affected, the material taken into the system, if, of a heating tendency, at a time when it is already too much stimulated by disease, irritates, and increases the effect of the disease.

Mr. FARRALL : If the ova are deposited in the spring on the grass, and taken up by intermediate agents, such as molluscs, &c., could nothing be found with which to dress the land so as to destroy these intermediate agents ?

Mr. THOMPSON said he thought the best thing to do was to destroy the embryo. This could easily be done by dressing the land with salt, because as soon as the ova burst out, and come in contact with salt they would die. Lime had failed to destroy either the ova or intermediate agents, and until the true natural history of the fluke was discovered let us follow the dictates of nature, and imitate the salt banks and salt marshes where the disease is not known, by dressing the land well with crushed rock salt, as it would tend to destroy intermediate agents as well as the embryo. The land was washed by the rains that fell upon it, and the salt, or salines, which it originally contained, in course of time, were drained down into the river beds and into the ocean, and if the necessary ingredients for the production and preservation of proper food for animals which lived on the natural products of the earth were not renewed, then it could not very well help producing disease in animals. When he first came to reside in Aspatia, he found that redwater in cattle was a very prevalent disease in the neighbourhood, but since the Agricultural Co-operative Society had been established a very large quantity of crushed-rock salt had been used for dressing land, and the result was that redwater, which was once so prevalent, had now disappeared. Most of the diseases met with in animals were due to the want of chlorides in the land. The waters of the Mediterranean were growing more salt every year, which seemed to confirm the theory that the salt of the land was being washed into the sea.

Mr. FARRALL said he had just another question to ask. It had struck him very forcibly that the dose of salt (one teaspoonful) referred to in the case of Mr. Twentyman's sheep was very small. If two teaspoonfuls had been administered would it not have cured them altogether?

Mr. THOMPSON said that salt was a very peculiar article, though a very common one. They tried two spoonfuls, and it brought on diarrhœa, evidently proving that two spoonfuls were too much. Salt was a very peculiar agent, and though simple, needed to be used with discretion.

Dr. JONES observed that the plains surrounding the Mediterranean were great salt producers, and that might have something to do with rendering the Mediterranean more salt since the opening of the Suez Canal. With regard to the administration of alkalies he might say that in some forms they were very relaxing if given in large quantities; more particularly in the case of sheep and cattle of an asthenic nature, while the chlorides were very forcible in their action, and suited their constitution much better. Horses were more the other way, and needed alkalies. Draining the land, he believed, would tend to lessen the conditions favourable to the development of disease. Wherever there was water there was ranker vegetable growth, which was favourable to the production and development of these little pests. Draining the land would be a good thing; he did not see why there should be these marshy places on the land. Fog or aftermath, he thought, must also be favourable to the production of this disease, and before turning either sheep or cattle into the fields to eat the fog, it would be a good thing to give it a dressing of salt. He hoped these few arguments would help to strengthen Mr. Thompson's remarks. His (Dr. Jones')

advice was that farmers should act upon Mr. Thompson's opinion, and dress the land in the way of prevention, and they would eventually effect a cure.

Mr. THOMPSON perfectly agreed with what Dr. Jones had said, both in reference to draining the land and dressing the fog with salt, as the salt would be taken into the stomach with the food, and do as much good in destroying the *pupæ* there as on the ground in the spring. Warm, damp situations and weather develop these diseases, while cold and dry seasons had exactly the opposite tendency. Remedies for most of these diseases were very simple, if they would only watch the processes of nature, and follow out the courses which she so plainly indicated.

Mr. PATTINSON thought Mr. Thompson had favoured them with a very good lecture, and as a veterinary surgeon he thought he had been very impartial. He might have made it a professional question and prescribed medicines, but it was very evident that Mr. Thompson's object was to benefit farmers, and not for his personal interest. (Hear, hear.)

Mr. BROCKBANK then proposed a vote of thanks to Mr. Thompson for his valuable paper, which had been both interesting and instructive. (Hear, hear.) It was a very good paper for farmers generally, and he had no doubt that the remedy Mr. Thompson had propounded for the complaints was the right one. He also thought Mr. Thompson had been very disinterested in recommending the use of salt for the prevention of diseases, from which he might reap a benefit. (Hear, hear.)

Mr. CARR seconded the proposition. He said it was an interesting paper, and he trusted they would benefit by it.

He thought the discussion on the subject of the paper was a very good thing, and when any idea struck them it was best to speak right out, and then they might get to the bottom of it. He was satisfied with the explanation given by Mr. Thompson, that the sheep he alluded to on the marsh must have contracted the disease before going there for the winter.

The CHAIRMAN, in putting the proposition to the meeting, alluded in eulogistic terms to the disinterestedness Mr. Thompson had always shown in trying to benefit the farming community, and had great pleasure in submitting the resolution.

The vote of thanks was warmly accorded to Mr. Thompson, and briefly acknowledged.



In commenting on the foregoing Paper, a thoroughly practical writer in the *West Cumberland Times* makes the following observations:—

“OUR SHEEP SUPPLY.

“In remarking a fortnight ago on the Agricultural position, we adduced some of the causes which appear to have a tendency to limit the farmer’s prosperity. The Aspatia Agricultural Society has now given us occasion to return to the subject, in particular reference to the decimation of our sheep flocks, owing chiefly to fluke in the liver or rot. During the past seven years there has been a decrease in the white stocks of the country to the tune of 19 per cent.; in the year ending June 4th, 1881, the decrease was considerably over two millions, and according to the evidence of Mr. Finlay Dun, the numbers that were victims to the fell malady in question, during the two preceding years, were almost, if not quite, as great. Now, it must be acknowledged that these losses will not only be felt by the farmers, who immediately sustain them, but also by the community at large as meat-consumers. It was, therefore, with the greatest satisfaction that we were able last week to publish a paper on Rot in Sheep, read at a meeting of the Aspatia Society, by Mr. Henry Thompson, V.S. The author both describes minutely the causes of the complaint, and also the transformations of the liver fluke through all its stages, until it finally reaches its natural habitat, the bile-ducts of the liver. He also gives some startling and important facts relative to its treatment, and in the peroration of his report strongly advises the use of salt as a

dressing for pastures, thereby correcting their acidity, destroying parasitic and insect life, and restoring to some extent the balance of nature which has gradually but surely been disturbed for countless ages by the washing of soils, and the conveying by rivers of much soluable or saline matter to the sea.

“It may be remembered that when speaking at Keswick, on a recent occasion, the Hon. P. S. Wyndham, M.P., referred to the putting of a light duty of 1s. per quarter upon grain, by means of which £4,000,000 could be raised, and this tax would not be perceptibly felt by the population. But by giving our undivided attention to prevent the maladies which destroy our ovine animals, as rot, louping-ill, &c., according to Mr. Thompson—and he does not dabble in theories without trying conclusions—£5,000,000 per annum might be saved, which would be a positive gain to the country, while the hon. member’s plan, if carried out, would be little else than taking money out of one pocket and putting it into the other. And, further, if, by the application of such a cheap and plentiful commodity as salt, the disastrous diseases alluded to could be annihilated, the sooner the agricultural body, and the commercial body as well, put their shoulders to the wheel the better for us all. With the new era in agriculture, which dawned upon us when artificial manures were brought into the field, the ground fairly shook under the thunder of mills, machines, and manufactories, busily engaged in the preparation of phosphatic and nitrogenous materials calculated to renovate the worn out-soil, but the saline or alkaline elements have either been neglected or forgotten. These are in the highest degree essential to plant life, as well as being important elements in animal organism, for healthy functions and general tone of the body. Salt, as we have already intimated, is plentifully diffused almost everywhere, and if it

was considered that in some districts the land-carriage would be a heavy item, lagoons might be formed on our coast lines and the salt obtained by means of evaporation as in days of yore. No purification would be needed for agricultural purposes, as the more rough and crude the article could be obtained the better. It would then contain the chlorides, iodides, and bromides in such quantites and proportions as would suit vegetable and animal life. The benefits accruing from this mode of procedure would be numerous; but, principally, diseases in stock would be reduced or diminished; the balance of nature, which is daily getting further out of joint, would be restored; a vast amount of labour created for the working population; railway enterprise benefited; in a word, the whole nation would partake of the blessings emanating from such a praiseworthy undertaking.

“This leads us to another important matter. From time immemorial stones have been carted from our cultivated lands, broken, and put upon the roads to make good the tear and wear upon them; but these never find their way back again. It may be argued by some that stones do very little good in furnishing plant food. Let us see. We all know that a quantity of silicates enters into the composition and formation of our cereals and other plants, and it stands to reason that our lands must be getting poorer in this respect every year, from their removal in every conceivable shape, as in stones, plants, and animals. If left upon the ground, the sulphuric and other acids contained in the artificial manures would to a certain extent render these silicates available for plant food, and failing this, it has been urged that ground silicates, granite, or whinstones might be distributed over the lands to restore the equilibrium which has been destroyed either wholly or in part, and so give strength to cereals and stamina

to the bones of animals. And while on this point we may notice that the produce of the county of Aberdeen, no matter whether fodder or root crops, will fatten cattle more rapidly than elsewhere, even all other things being equal. But it must be remembered that the soil of this county is chiefly produced from the crumbling down of igneous rock, inasmuch as we there come upon the granite regions. The answer is apparent. Silicates are abundantly developed, and the crops feeding thereon partake largely of the benefits. Turnips and straw, natural products, will fatten and finish cattle for the shambles, while in many localities they would scarcely maintain them in good, ordinary, or keeping condition. Some feeders never give cake or corn at all; others furnish 3 lbs. or 4 lbs. daily for about a month before the finish, to give what is termed the "last dip," and this is all the extraneous food they get or require. Another remarkable fact is that the native animals are of strong constitution and remarkably free from disease.

"But returning to Mr. Thompson's admirable paper, we repeat that it ought to induce farmers to try some of the preventatives to disease therein propounded. This would not be a game at haphazard, as the proofs he advances conclusively guarantee, and no one need be afraid, after such satisfactory results have been achieved, that the play would fail to be worth the candle. Moreover the remedial measures are not expensive; and when we find cheapness and efficiency going hand in hand we may reasonably surmise that the *modus operandi* recommended has emanated from one who takes for his text the best motto of the day—Practice with Science.

The following letters are from gentlemen whose lands have been benefited by the application of salt :—

HALL BANK, ASPATRIA,

3rd December, 1880.

DEAR SIR,—In reply to your enquiry respecting my experience in the use of Common Salt as a Manure, I beg to say that I have used it extensively for the last twenty years, having given all the land I occupy frequent dressings.

When applied to pastures, I am thoroughly convinced that it has the effect of improving the health of the Stock grazed thereon. I may give you a recent example of the beneficial effects :—Having the management of a farm in the County of Surrey, a portion of which is coarse pasture, I found that Sheep grazed on this particular part of the farm were liable to sudden attacks of illness, which always proved fatal in two or three hours. On enquiry, I found that little or no Salt had ever been used on the farm, consequently I top-dressed the portion alluded to last Spring at the rate of six or seven cwts. per acre. I am glad to say that since doing so I have not lost a Sheep from the old complaint.

In my experience I have never observed that the *appearance* of the herbage was altered by the application of Salt, but it has a marked effect on its character, converting—as it frequently does—unhealthy and innutritious grasses into healthy and nutritious food.—I am, yours truly,

WILLIAM NORMAN.

To Mr. Henry Thompson.

BLENNERHASSET FARM, ASPATRIA,

3rd December, 1880.

DEAR SIR,—In answer to yours, I beg to say that during the first few years of my tenancy at Edderside, my cattle were subject to a great amount of disease and death from Redwater, more particularly when the animals were depasturing on the mossy part of the farm, where the vegetation was of an acid character. Having been recommended to try an application of Common Salt, I am pleased to say that the result was an entire disappearance of the disease. So convinced am I of the beneficial effects of Salt on the health of animals, that I continue to use a quantity in combination with Potash Salts along with my Artificial Manures.

Mr. Thompson.

JOHN TWENTYMAN.

PLUMBLAND MILL, ASPATRIA,

4th December, 1880.

DEAR SIR,—For several years after I took possession of the grazing land, known as Gill Gooden, I annually sustained very heavy losses from Redwater amongst my Cattle. I may also state that the place had been well known to be a great hot bed for the disease, my predecessor, Mr. William Norman, Hall Bank, having suffered severely in a like manner. On your recommendation, I was induced some few years ago, to apply 5 cwt. per acre of Common Salt to the land, and I have great pleasure in saying that I have not had a single case since. I continue to dress the pasture about every third year. The soil is of a strong texture and herbage of a sour character.

Mr. Thompson.

JONATHAN HOLLIDAY.

MIRESIDE, BASSENTHWAITE,

4th December, 1880.

DEAR SIR,—During the first ten years of my occupation of Mireside, my Cattle were much subjected to Redwater, and any animal not bred upon the place, suffered severely from the complaint, more especially the milch cows, and I endured many losses in consequence.

Since applying Agricultural Salt, with which I was recommended to dress my pasture, I have not had a case, and the result is all that could be wished.

You are at liberty to make what use you think best of this letter, and believe me,—Yours very truly,

Mr. Thompson.

WILLIAM SLATER.

THE HOW, BRAMPTON,

December, 1880.

DEAR SIR,—When dressing a light sandy soil for turnips last Spring, I gave one acre in the centre of the field 8 cwt. of Salt, in addition to other portable manures. The crop on the salted portion was heavy and excellent, while that on the remainder of the field was poor, and the roots badly smitten with finger-and-toe. Moreover, the sheep when folded upon a portion of each simultaneously, ate the turnips on the salted part to a shell, while the others remained almost intact. Salt used on light land I am convinced possesses virtues, which are yet comparatively unknown.

Mr. Thompson.

ISAAC LAMB.

SALT HOUSE, MILLOM.

7th December, 1881.

DEAR SIR, -I have great pleasure in bearing testimony that, by the application of Crushed Rock Salt to the lands on Millom Parks, it has been the great means of preventing, in my opinion, Redwater in Cattle and Louping-ill in Sheep. For years these Parks have been noted for the large number of deaths in cattle and sheep. Last year I lost 9 cows and nearly 100 sheep, and on your recommendation I bought 120 tons of Salt and dressed the land at the rate of 8 cwt. per acre. Between January and March, I am glad to say, that I have only lost 2 cows and 2 sheep since the application, and these cases were in May, June, and July. Since then I have not had a case, whereas in former years the worst time for disease and deaths was July and August. I feel certain that none of us know the real and vast importance of the use of this extensive common article.

Yours truly,

J. HARKER.

To Mr. H. Thompson, V.S.,
Aspatria.



In confirmation of the preceding Testimonials, I may state that, during the past Twelve years, there has been a marked diminution in all classes of blood and parasitic diseases in Cattle and Sheep over the immediate neighbourhood in which my practice as a Veterinary lies, while other maladies have assumed a much milder form.

This I attribute to the greater use of alkalies in connection with phosphatic and nitrogenous manures. Since the formation of the ASPATRIA AGRICULTURAL CO-OPERATIVE SOCIETY a quantity of Common Salt and Potash Salts has been distributed over the land. Practical results, borne out by the analysis of blood, show that the more the nature of these articles are understood the more they will be used. The improvement in the health of the stock of the farm alone ought to be a sufficient reason to induce farmers to apply Salt and Potash Salts in increased quantities.

H. THOMPSON, V.S.

Transf. from
Bot. Dept. 11/3/11.
H.W.E.



